At what points is the function $g(x)$ that is indicated below continuous?

$$g(x) = \begin{cases} \frac{x^2 - x - 6}{x - 3} & \text{if } x \neq 3, \\ 5 & \text{if } x = 3. \end{cases}$$

Solution. If $x \neq 3$, then $g(x) = \frac{x^2 - x - 6}{x - 3} = \frac{(x+2)(x-3)}{x-3} = x + 2$. Thus

$$\lim_{x \to 3} g(x) = 5.$$ 

This happens to be the function’s value. So the function is continuous for all real numbers.